

GROWERTALKS

Pest Management

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A Breakdown of Aphid Parasitoids & Predatory Mites

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Biological control is a common plant protection strategy used in both ornamental and vegetable growing systems, and involves the preventative release of parasitoids and predators to regulate insect and/or mite pest populations. The parasitoids and predators widely used in greenhouses are associated with aphid parasitoids and predatory mites.

This article describes the commercially available parasitoids of aphids and predatory mites that feed on thrips, whiteflies, mites and/or fungus gnats.

Aphid parasitoids



Aphidius ervi parasitizes “large” aphid species, such as the potato (*Macrosiphum euphorbiae*) and foxglove (*Aulacorthum solani*) aphid. Adults are 4.0- to 5.0-mm long, black, with long antennae.

Development time is contingent on temperature. For instance, the life cycle (egg to adult) takes 14 days at 70F (21C) and 20 days at 59F (15C).

Females have an efficient searching capacity. Females, in general, use their antennae to examine an aphid host in order to assess size and determine if the aphid has already been parasitized. Females lay eggs into aphids by means of rapid movement of the abdomen. A female will curl her abdomen under her body and then “poke” the aphid using her ovipositor (egg-laying device) to insert an egg. Eggs hatch into larvae that consume the internal contents of aphids. The parasitized or “mummified” aphids are golden-yellow to brown in color. *A. ervi* can parasitize many aphids in a day.

Aphidius colemani parasitizes “small” aphid species, including green peach (*Myzus persicae*) and cotton/melon (*Aphis gossypii*) aphid. Adults are 2.0 to 3.0 mm in length with long antennae.

Adults possess an efficient searching ability in that they can locate low populations or small patches of aphid colonies on plants. The mummies associated with aphids parasitized by *A. colemani* are leathery and golden-brown in color. The life cycle is similar to *A. ervi* (described above). The optimum temperature for development and parasitism rates is around 86F (30C).

Aphelinus abdominalis parasitizes potato and foxglove aphids, and other aphid species. Adults are 3.0-mm long with short antennae, black and yellow, and are more compact in shape than either *A. ervi* or *A. colemani*.

Females approach an aphid and then insert eggs, using her ovipositor, into the aphid while walking backwards. The mummies affiliated with aphids parasitized by *A. abdominalis* are black. The black mummy forms in approximately seven days after an egg is inserted, and then after 14 days, an adult emerges from the “mummified” aphid. *A. abdominalis* females will feed on aphids, killing about two per day.

Aphidius matricariae parasitizes green peach and cotton/melon aphid, and is similar in appearance to *A. colemani*. Adult females can live between 15 to 17 days, parasitizing >200 aphids, in addition to killing aphids when feeding in order to obtain nutrients. The optimum temperature for development is 77F (25C). *A. matricariae* is less tolerant of high temperatures (> 86F/30C) that typically occur in greenhouses during the summer months.

Predatory mites

Phytoseiulus persimilis only attacks the two-spotted spider mite (*Tetranychus urticae*). All mobile life stages actively search for prey and feed on all life stages of the two-spotted spider mite.

Adult females are pear-shaped, orange to bright-red in color and larger than two-spotted spider mites. *P. persimilis* is most effective when temperatures are between 54 and 80F (12 and 26C) and the relative humidity is between 60% and 70%. At temperatures between 68 and 72F (12 and 26C), *P. persimilis* develops from egg to adult twice as fast as the two-spotted spider mite. However, a relative humidity of >90% or less than 55% will disrupt egg survival. Furthermore, when temperatures are 95F (35C) the predatory mite moves down the plant and resides in areas or the canopy that's cool and shady.

Females lay approximately 60 eggs during their 50-day lifespan. The predatory mite can consume up to 20 eggs or nymphs/larvae per day. The predatory mite has an efficient searching capacity, high predation rate and high reproductive capacity. *P. persimilis* can be so efficient that the predatory mite can actually “eliminate” a two-spotted spider mite population.

Distribution of the predatory mite is enhanced among a crop when plant leaves are touching. However, movement is inhibited on smooth-leaved plants, such as dianthus and leaves with sticky hairs or trichomes like those on tomato.

Neoseiulus (=Amblyseius) cucumeris feeds on thrips [e.g., Western flower thrips (*Frankliniella occidentalis*)], broad mite (*Polyphagotarsonemus latus*), cyclamen mite (*Phytonemus pallidus*) and tomato russet mite (*Aculops lycopersici*). Adults are 1.25-mm long and pale-brown.

The predatory mite only attacks the 1st instar larva of the Western flower thrips. However, they will “harass” 2nd instar larvae, which can reduce the number of thrips that pupate. Adults consume one prey per day. *N. cucumeris* will feed on pollen as an alternative food source in the absence of prey.

The predatory mite is tan-orange in color and females lay up to 35 eggs during a 30-day lifespan. *N. cucumeris* is most active at temperatures between 60F (16C) and 86F (30C). Development from egg to adult is hindered at a “low” relative humidity.

Neoseiulus (=Amblyseius) californicus feeds on the two-spotted spider mite, broad mite and cyclamen mite. Moreover, the predatory mite will feed on pollen as an alternative food source in the absence of prey.

Development from egg to adult takes 10 days at 70F (21C) and five days at 86F (30C). *N. californicus* adult females are 1.25-mm long, ivory colored and pear-shaped. Females lay >60 eggs during their 20-day lifespan. Females attach eggs to leaf hairs on the underside of leaves along the veins in close proximity to mite colonies.

The predatory mite tolerates higher temperatures and a lower relative humidity than *P. persimilis*. However, *N. californicus* is less effective than *P. persimilis*, as fewer eggs are laid, and *N. californicus* has a lower rate of population growth. Moreover, the searching ability of *N. californicus* is less efficient and consequently less prey are consumed.

Neoseiulus (=Amblyseius) fallacis feeds on many different types of mites, including two-spotted spider mite, broad mite, cyclamen mite and russet mites. In addition, the predatory mite will feed on pollen in the absence of prey.

Adults are initially ivory-colored and pear-shaped. They eventually become red-brown in color after consuming prey. Adult females can consume up to 16 mites per day and can lay up to 60 eggs during a 14- to 60-day lifespan. The life cycle (egg to adult) takes seven to nine days; however, this is dependent on temperature. *N. fallacis* tolerates cooler temperatures better than most predatory mites.

Amblyseius andersoni attacks a diversity of mites, including two-spotted spider mite, broad mite, cyclamen mite and russet mite. The mobile stages of the predatory mite feed on all life stages (e.g., eggs, young and adults) of prey. Furthermore, *A. andersoni* will feed on pollen, fungal spores and plant exudates as an alternative food source or in the absence of prey.

A. andersoni is <1.0 mm in length and light-brown to orange. Adult females lay approximately 35 eggs during their lifespan. Female adults attach eggs onto leaf hairs or trichomes. The predatory mite is most active when temperatures are >50F (10C). *A. andersoni* will enter diapause in fall and overwinter, locating themselves in cracks and crevices.

Amblyseius swirskii feeds on the 1st instar larvae of thrips (e.g., Western flower thrips), spider mites, broad mite and russet mites, as well as the eggs and nymphs of whiteflies. The predatory mite can consume up to 10 thrips, 10 whitefly nymphs or 20 whitefly eggs per day. Pollen serves as an alternative food source in the absence of prey.

A. swirskii is most active at temperatures >77F (25C) with optimum temperatures between 77 and 83F (25 and 28C). The life cycle, from egg to adult, can be completed in <7 days. A relative humidity >70% is best to prevent eggs and larvae from dehydrating. Female adults lay two eggs per day, although this is contingent on prey type. Adult females lay eggs on leaf hairs or trichomes.

The predatory mite may be used in combination with other natural enemies. Furthermore, studies have shown that *A. swirskii* is more effective when thrips and whiteflies are present simultaneously.

Galendromus (=Metaseiulus) occidentalis feeds on the two-spotted spider mite, broad mite, cyclamen mite and tomato russet mite. They're initially white and then turn brown to red in color, depending on the host fed upon.

The predatory mite adults can consume up to 20 eggs during their 30-day lifespan. Development from egg to adult takes seven to 14 days depending on temperature. *G. occidentalis* tolerates higher temperatures and a lower relative humidity better than *P. persimilis*.

Mesoseiulus longipes feeds on various mite species, including the two-spotted spider mite. Females lay approximately 50 eggs during their 13- to 40-day lifespan. The predatory mite tolerates higher temperatures and a lower relative humidity better than *P. persimilus*.

Stratiolaelaps scimitus (formerly *Hypoaspis miles*) is a soil-borne predatory mite that feeds on fungus gnat (*Bradysia spp.*) eggs, larvae, pupae and Western flower thrips pupae. Further-more, the predatory mite will feed on root aphids.

Nymphs and adults are predaceous. *S. scimitus* is brown and inhabits the top 1.0 in. (2.5 cm) of the growing medium. The predatory mite can be used in conjunction with entomopathogenic (beneficial) nematodes, such as *Steinernema feltiae*.

Amblyseius degenerans feeds on thrips (e.g., Western flower thrips) and will also feed on pollen as an alternative food source. Similar to *N. cucumeris*, *A. degenerans* is mostly effective in “harassing” the larval stages of thrips, which may reduce the level of damage caused by thrips feeding. The predatory mite tolerates a lower relative humidity and has a higher population growth than *N. cucumeris*.

Amblydromalus limonicus feeds on thrips, whiteflies and spider mites. The predatory mite attacks the 1st and 2nd instar larvae of thrips. In addition, *A. limonicus* will feed on pollen from sweet pepper and other crops as an alternative food source or in the absence of prey.

The predatory mite is active at temperatures between 55 and 86F (13 and 30C). Female adults lay one egg per day. *A. limonicus* doesn't undergo diapause during the winter. **GT**

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